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09/696,956	10/27/2000	Daniel E. Fisher	001.00001	3189

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08/25/2005

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EXAMINER

CHOW, CHARLES CHIANG

ART UNIT	PAPER NUMBER
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2685

DATE MAILED: 08/25/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/696,956	Applicant(s) FISHER, DANIEL E.	
	Examiner Charles Chow	Art Unit 2685	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
 - If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
 - If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
 - Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 13 June 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-23 is/are pending in the application.
4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 3-8, 18 and 19 is/are allowed.
- 6) ☒ Claim(s) 1, 2, 9-12, 14-17 and 20-23 is/are rejected.
- 7) ☒ Claim(s) 13 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

Detailed Action

(Amendment Received on 6/13/2005)

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

1. Claim 16 is rejected under 35 U.S.C. 102(e) as being anticipated by Johnson (US 4,245,220).

Regarding claim 16, Johnson teaches a method comprising the step of capturing frequency difference that is present at first and second antennas [transducers 1, 2 has the antenna function for transforming a pair of received echo signal in air to electrical signals, abstract, Fig. 1-2, to capture frequency difference $\Delta f \times (t/T)$ from f_0 , col. 2, lines 7-16. It is well known the transducer is to transforming energy in air to electrical signal], producing an information signal onto which the frequency difference has been modulated [the mixer 3 receives carrier frequencies from mixers 4 and mixer 10 to produce frequency difference which is modulated by transmitter, Fig. 2, col. 2, lines 35-48], analyzing the information signal to determine the frequency difference [the analyzing received echo slots in col. 1, lines 28-33; the analyzing frequency difference between transducers 1, 2, is $\Delta f \times (t/T)$ in col. 2, lines 7-16, the analyzing using processor for the signal from filter bank in col. 2, lines 54-60; the frequency difference in col. 3, lines 55-60; the Δf in col. 2, line 61 to col. 3, line 65).

Claim Rejections - 35 USC § 103

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The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-2, 9, 14-15, 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Johnson-'220 in view of Kitayama et al. (US 5,107,522).

Regarding **claim 1**, Johnson teaches a receiver comprising an rf bridge (col. 2, col. 2, lines 35-48, col. 1, line 4-33), first and second frequency converters coupled to respective first and second antennas (the antenna transducers 1, 2, at A, B, are coupled to the first, second, mixer converters 10, 4, Fig. 2), a third frequency converter coupled to the outputs first and second frequency converters (frequency converter 3 coupled to the outputs of first, second, converters 10, 4, via filter 1 1-12, Fig. 2). Johnson teaches a processor coupled to the filters bank 7, 8 (col. 2, lines 55-60). Johnson fails to teach the processor and an rf bridge coupled to the processor to receive reference signal from the processor, However, Kitayama teaches these features, Fig. 1 1, the microprocessor 307 coupled to frequency conversion 1, via reference oscillator 324, via Vco 309 having the reference oscillator 324 controlled by microprocessor 307, col. 20, lines 44-68,' abstract, col. 3, lines 30-68, col. 4, lines 46-51). Kitayama teaches the simple, low cost oscillator frequency control via microprocessor (col. 3, lines 8-38), for the controlling of Johnson's oscillator frequency 1. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to modify Johnson with Kitayama's microprocessor controlled oscillator signal for frequency conversion 1, such that the frequency error could be simply directly control by microprocessor, with low cost.

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Regarding **claim 2**, Johnson teaches the first and second frequency converters (10,4) receive respective first and second signal from the respective first and second antennas (transducer 1, 2), the third frequency converter (3) heterodynes signals from the first and second frequency converters (signal from mixer 4, 10 via filters 11-12), to provide a signal that is characterized by a frequency difference modulated onto the reference signal (the modulated frequency difference at the output of mixer 3 is modulated by frequency f_b), the frequency difference being a difference between a frequency of the first signal and a frequency of the second signal (the frequency difference of the two transducer received signals having value of $\Delta f \times (t/T)$ in col. 2, lines 7-16; the analyzing using processor for the signals from filter bank in col. 2, lines 54-60, the frequency difference in col. 3, lines 55-60, the Δf in col. 2, line 61 to col. 3, line 65).

Regarding **claim 9**, Johnson teaches a receiver comprising an rf bridge (Fig. 2), circuitry to detect a frequency difference (the circuitry in Fig. 2 for detecting the frequency difference of the two transducer received signals having value of $\Delta f \times (t/T)$ in col. 2, lines 7-16; the analyzing using processor for the signal from filter bank in col. 2, lines 54-60; the Δf in col. 2, line 61 to col. 3, line 65), from the information signal based on the signal from the clock source (oscillator frequency f_b). Johnson teach the processor coupled to the rf bridge to receive an information signal from rf bridge (the processor coupled to the filers bank 7, 8 in col. 2, lines 55-6%. Johnson fails to teach a digital frequency source to generate a reference signal based on a signal from clock source, the reference signal being coupled to the rf bridge.

However, Kitayama teaches these features [Fig. 11, the microprocessor 307 coupled to frequency conversion 1, via reference oscillator 324, via Vco 309 having the reference oscillator 324 controlled by microprocessor 307, col. 20, lines 44-68,

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abstract, col. 3, lines 30-68, col. 4, lines 46-51; reference oscillator 324 provides clock source from frequency divider 412, [Fig. 14, col. 14, lines 58-64] . Kitayama teaches the simple, low cost oscillator frequency control via microprocessor (col. 3, lines 8-38), for the controlling of Johnson's oscillator fb. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to modify Johnson with Kitayama's microprocessor controlled oscillator signal for frequency conversion 1, such that the frequency error could be simply directly control by microprocessor, with low cost.

Regarding **claim 14**, Johnson teaches the rf bridge (Fig. 2) include first and second rf frequency converters (10, 4) coupled to respective first and second antennas (antenna transducers 1, 2); and a third rf frequency converter coupled to output of the first and second rf frequency converter (mixer 3 coupled to the output of mixer 10, 4, via filter 11,12).

Regarding **claim 15**, Johnson teaches the first and second frequency converters (10,4) receive respective first and second signals from the respective first and second antennas (transducer 1, 2), the third frequency converter (3) heterodynes signals from the first and second frequency converters (signal from mixer 4, 10 via filters 11-12), to provide a signal that is characterized by a frequency difference modulated onto the reference signal (the modulated frequency difference at the output of mixer 3 is modulated by frequency fb), the frequency difference being a difference between a frequency of the first signal and a frequency of the second signal (the frequency difference of the two transducer received signals having value of $\Delta f \times (t/T)$ in col. 2, lines 7-16; the analyzing using processor for the signals from filter bank in col. 2, lines 54-60,. the frequency difference in col. 3, lines 55-60., the Δf in col. 2, line 61 to col. 3, line 65).

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Regarding **claim 21**, Johnson teaches a receiver comprising the rf bridge (Fig. 2), an rf bridge (Fig. 2) that includes plurality frequency converters (mixer 10, 4, 3) and two antennas (antenna transducers 1, 2), the rf bridge providing an information signal to the processor that is characterized by the frequency equal to the reference frequency modulated by a frequency difference (the processor coupled to the filters bank 7, 8 in col. 2, lines 55-60; the mixer 3 output difference frequency modulated by fb, col. 2, lines 35-48; the two signals are then mixed giving rise to > frequency difference in col. 3, lines 1-10, the calculation of frequency difference in col. 3, lines 50-65), frequency difference being a difference between a frequency (f_0) of a signal received at one of the two antennas and a frequency and a frequency ($f_0 + \Delta f \times (t/T)$) of a signal received at another of the two antenna (the two signals received via two antenna transducers 1, 2 at A, B, $\Delta f \times (t/T)$ in col. 2, lines 7-16). Johnson fails to teach the a processor providing a reference signal characterized by a reference frequency. However, Kitayama teaches these features, Fig. 1 1, the microprocessor 30.7 coupled to frequency conversion 1, via reference oscillator 324, via Vco 309 having the reference oscillator 324 controlled by microprocessor 307, col. 20, lines 44-68; abstract, col. 3, lines 30-68, col. 4, lines 46-51). Kitayama teaches the simple, low cost oscillator frequency control via microprocessor (col. 7, lines 8-38), for the controlling of Johnson's oscillator frequency fb. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to modify Johnson with Kitayama's microprocessor controlled oscillator signal for frequency conversion 1, such that the frequency error could be simply directly control by microprocessor, with low cost.

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3. Claims 10-11, 17, 20, 22-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Johnson-E220 in view of Kitayama, as applied to claim 9 above, and further in view of Deslardins (US 5,570,099).

Regarding **claim 10**, Johnson, Kitayama, fail to teaches the circuitry to detect includes a first fourier transformer having a first frequency and a second fourier transformer having a second center frequency, the first center frequency being different than the second center frequency. However, Deslardins teaches these features, the first, second, fourier transforms 18, 34, for respective first, second, center frequency associated with the different center frequencies of each FM filters 20, 36, for determining of the transmitter location from two antenna signals (abstract, Fig. 1-3, col. 3, lines 35-59, col. 2, line 65 to col. 3, line 25', col. 5, lines 37-45). Deslardins teaches the measuring, calculating, of the range, and the difference in range AR, the frequency difference of arrival (col. 1, lines 3-43), with accuracy to minimize error (col. 3, lines 17-31) for locating a transmitter. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to modify Johnson with Deslardins accommodate digital processing Hilbert transforms, FM filter for two receiving path, such that the calculated frequency difference, range, information could be accurate.

Regarding **claim 11**, Deslardins teaches the circuitry to detect includes a digital frequency generator (analog to digital converters 16, 32), that generates a first digital signal at the first center frequency coupled to the first fourier transform, and a second digital signal at the second center frequency coupled to the second fourier transform (the Hilbert transforms 18, 34, coupled to the respective A/D converter 16, 32 with first center frequency for FM filter 20, and second center frequency for FIR filter 36, abstract, Fig. 1-3, col. 3, lines 35-59, col. the detecting of angular discrimination of

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targets by airborne radar (abstract; Fig. 1-3, col. 1, line 11 to col. 24). Maitre teaches the Doppler frequencies can be selected with extreme precision for the very fine angular discrimination (col. 1, lines 41-45), such the angle of signal arrival from target can be very finely measured. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to modify Johnson, Kitayam, Deslardins, with Maitre's discriminator coupled to frequency analysis, such that the angle of signal arrival could be accurately measured.

Regarding claim 17, DesJardins the step of analyzing (Fig. 3) include forming a first Fourier transform (Hilbert transform 18) of the information signal at a first center frequency (center frequency used by FIR filter 20), forming a second Fourier transform (Hilbert transform 34) of the information signal at a second center frequency (center frequency used by FIR filter 36), the second center frequency being different than the first frequency (the center frequency for FIR filters 20 is for frequency of receiver 10 which is different from center frequency of FIR filter 36 which is for frequency of receiver 12).

Regarding claim 20, DesJardins teaches a step of determining a range between an emitter generating the ^{signal} and a point between the first and second antennas (col. 5, lines 36-45).

Regarding claims, 22, 23, DesJardins teaches the determining a range based on the frequency difference (the equation has the relationship for the range difference $R_1 - R_2$ and the frequency difference $v = f * (R_1 - R_2) / c$ in col. 1, lines 9-27; the correcting frequency difference v in col. 5, lines 11-45; the determining of the accurate value of frequency difference v in col. 6, lines 51-62).

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4. Claim 12 is rejected under 35 U.S.C. 103 of Kitayama, DesJardins, as applied to claim 10 above, and further in view of Maitre et al. (US 4,903,030).

Regarding claim 12, DesJardins teaches 1 transform 18, 34). Johnson, Kitayam, DesJardins fail to teach the frequency discriminator coupled to the fourier transform. However, Maitre 27 (Fig. 1) is coupled to the frequency analysis 26 (Fig. 1) for the detecting of angular discrimination of targets by airborne radar (abstract, Fig. 1-3, col. 1, line 11 to col. 24, line 5). Maitre teaches the Doppler frequency can be selected with extreme precision for the very fine angular discrimination (col. 1, lines 41-45), in order to finely measure the angle associated with a target. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to modify Johnson, Kitayama, DesJardins, with Maitre's frequency analysis in discriminator, in order to accurately determined the angle information.

Claims Objection

5. Claim 13 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. The prior art fails to teach the structure in claim 13, and the equation for frequency difference in claim 19.

Claims allowable

6. Claims 3-8, 18-19 are allowable over the prior art of record. (in last office action also). The following is the examiner's statement for the reasons of allowance:
- Claims 3-8, 18-19 are allowable over the prior art of record, the prior art fails to teach singly, particularly, or in combination, the subject matter, for the structures in claims 3, 5, 6, and the **wherein the integration interval is inversely proportional to a**

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difference between the first center frequency and the second frequency in

claim 18. The dependent claims are also allowable due to their dependency upon the independent claims and having further claimed features.

The closest prior art to **Johnson (Us 4,245,220)** teaches the first, second, third frequency converters having two antennas for calculating the frequency difference to determining the target location (abstract, frequency different $\Delta f \times (t/T)$ in col. 2, lines 7-16; the analyzing using processor for the signals from filter bank; col. 2, lines 54-600; the frequency difference in col. 3, lines 55-60; Δf in col. 2, line 61 to col. 3, line 65). Johnson fails to teach the structures in claims 3, 5-6, and the where the integration interval is inversely proportional to a difference between the first center frequency and the second frequency.

Other prior arts are considered but they fail to teach the above claimed features in claim 3-8, 18-19.

Stone (US 3,680,124) teaches the determining of the azimuth information from the signal difference from antennas A1-A2. Stone teaches the third frequency converter 71 coupled to the first, second frequency converter 65/67. Stone fails to teach the fourth frequency converter, the additional up converter/down converter coupled to the rf bridge and processor, having first, second fourier transform center frequency.

Cash (US 4,509,052) teaches the reinterferometer/Dopper target location system (abstract, 1-6), frequency converters 10/12, for measuring elevation angle, azimuth angle and range (abstract, summary of invention, his claims 1, 10), the processor 34 to analyzer frequency difference according to equations (col. 7, lines 3-24).

DesJardins (US 5,570,099) teaches the accurate range and frequency calculation FDOA, using digital signal processing, Hilbert transforms, FIR filters, to analyzing two

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antenna received signals, to locating a transmitter (abstract, Fig. 1-3, col. 3, lines 35-59; col. 2, line 65 to col. 3, line 25; col. 5, lines 37-45; col. 3, lines 17-31).

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Response to Argument

7. Applicant's arguments filed 6/13/2005 have been fully considered but they are not persuasive.

Regarding applicant argument for the no teachings from Johnson-'220 for the two antennas, due to Johnson's transducer 1, 2 are not antennas; the Johnson does not capturing the frequency difference just measuring bearing; the Johnson is in the sonar system which is in different field from applicant's invention; the Kitayama is not analogous and does not teach the clock source, as shown in pages 8-11, 18 of applicant's amendment.

Regarding Johnson-'220 for the two antennas, transducer 1, 2 are not antennas, Johnson teaches two receiving transducers 1, 2, which performs antenna function to transform received signal energy in air into electrical signal, and this is well known in the technology about the transducer.

Regarding Johnson does not capturing the frequency difference, just measuring bearing, Johnson teaches the capturing frequency difference from mixer 3 by mixing the echo signals received at second transducer 2 of the same frequency f_0 with the signal received at the first transducer 1 having frequency of $f_0 + \Delta f \cdot (t/T)$. The

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difference is $\Delta f \cdot (t/T)$ which contains the frequency difference Δf with known time t/T value [col. 1, line 64 to col. 2, lines 16].

Regarding Johnson is in the sonar system which is in different field from applicant's invention, Johnson's system can be applied to radar navigation system [col. 4, lines 34-37] which is the similar system to applicant's angle rate interferometer used for aircraft navigation.

Regarding the Kitayama is not analogous; Kitayama does not teach the clock source, Kitayama teaches the reference oscillator 324 is controlled by microprocessor 307 [Fig. 11], the reference oscillator 324 output digital signal from divider 412, [Fig. 14, col. 12, lines 58-64], for the stable microprocessor controlled frequency of the AFC [col. 3, lines 32-37] to control the oscillator frequency of the frequency converter 1, such as Johnson's frequency converter, mixer 3, for the analogous in controlling Johnson's output frequency of mixer 3, to the controlling of the output frequency from the frequency converter 1.

8. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

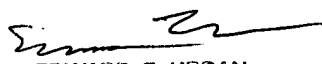
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Conclusion

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Charles C. Chow whose telephone number is (571) 272-7889. The examiner can normally be reached on 8:00am-5:30pm.
- If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Edward Urban can be reached on (571) 272-7899. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Charles Chow C.C.

August 05, 2005.


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